interactive computing
The Newsletter of The Association of Time Sharing Users

PRESS REVIEW

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a perspective on the IBM 5100

Some crackerbarrel philosophizing on the historical and competitive significance of this unique package.

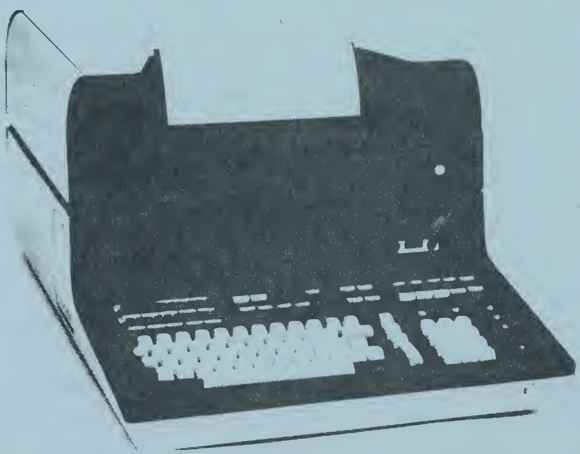
The IBM 5100 Portable Computer represents a unique development in computer history, but its uniqueness rests neither on its size, price or portability. Even the Hewlett-Packard Model 65 programmable scientific pocket calculator, introduced in January 1974 at under $800, excels the 5100 in each of those three criteria. Neither is the 5100 unique in providing alphanumeric I/O and auxiliary mass memory in a portable, interpretive-language computer. Wang Computer Laboratories, among others, has been offering such systems for about a year, and at some two-thirds the price.

What is unique about the 5100 is the vast amount of memory it contains. Memory capacity is still the largest single cost element in a minicomputer, and, particularly in a computational system, by far the most important single factor in rating its power. The reason for this is that unlike, for example, bandwidth in a communication system, memory capacity is rarely negotiable. One can usually trade off the cost of more connect time against the cost of widerband (i.e., faster) lines, but there are many classes of problems that cannot even be attempted at memory capacities below, say, 16K bytes. There is simply nothing to trade.

Speed, the most important cost factor in *choice* of memory, is, of course, also related to performance. However, as opposed to minis for real-time applications, where even a single millisecond can be critical, extra seconds are rarely noticed in small-scale computational systems.

PROGRAMMABLE SYSTEMS

Programmability and memory are interdependent, but not identical. A microprocessor can handle simple algorithms quite well, and it doesn't care if the data comes from internal semiconductor storage, external magnetic storage, or is entered digit-by-digit from a keyboard. The difficulty comes when the needed algorithm is not *pre*programmed. Using those that are to solve those that aren't is what programming is all about. But a "closed" system limited to only a hundred or so very slow-acting arithmetic statements is a computer in name only. It is hardly what a software specialist would have in mind when describing a "programmable system." That label properly applies only to systems capable of handling a full repertoire of branching, looping, nesting, etc. operations. The fact that a low-priced system might still not be able to do very much with those capabili-



MOST VERSATILE. The Hewlett-Packard Series 9800, Model 30 calculator, shown here with page-width thermal printer, is offered with a broader line of peripherals and special-purpose interfaces than any other desktop unit.

COMPUTER AT A CALCULATOR PRICE. The Wang System 2200-S, a full-function BASIC system from the most experienced supplier of desktop interactive computers.

ties (i.e., memory capacity might still be low) becomes less important than that the capabilities at least exist. "Programmability," or the ability to manipulate data, precedes "program ability," or the ability to describe entire procedures.

The first approach to reducing the cost of programmable systems to the point where they could be economically justified by individual researchers was time-sharing. While in-house time-sharing systems with per-terminal costs below $10,000 were available prior to 1970, their overall cost typically ran well over $250,000. Small users had nothing to compare with the offerings of commercial T-S services.

By 1970, most of the larger T-S services were offering BASIC as their standard, interactive computational language, and in-house systems manufacturers followed suit. One of the first companies to offer an in-house, BASIC-language T-S system around that time was Hewlett-Packard.

In January 1970, a feature article in MODERN DATA described the System I from Interplex Corp. of Waltham, MA, to our knowledge the first in-house system with dedicated BASIC-language terminals, albeit with numeric-only output. Using a Honeywell H-316 processor, the Interplex I could handle up to 16 such terminals, and only five were necessary to bring the per-terminal cost to under $10,000.

Later that same year, Wang Laboratories introduced the 3300, also a 16-user BASIC system, but built around a proprietary byte-oriented TTL processor and much lower in price. (Interplex subsequently folded its tent.)

These early low-cost T-S systems became quite popular, although the amount of memory available to each user was invariably under 16K bytes. Today there are several 16- and 32-user in-house T-S systems that provide considerably more memory to each user, and at a per-terminal price well under $10,000. But by the end of 1973, sophisticated pocket calculators had become very popular, and attention shifted to stand-alone systems with internal processors. Quite logically, people wondered how much more could be done with a box that was not constrained to fit in a pocket. They had not long to wait.

BASIC ON A DESK

"Programmable" desk-top calculators had, of course, been around since the late Sixties (e.g., Wright Line's "Mathatron" and Wang Laboratories' "LOCI"), but they were hardly a match even for today's numeric-only pocket versions. The first two breakthroughs were the Hewlett-Packard 9830A and the Wang Laboratories 2200-S, both introduced in 1974, both BASIC-language systems and both available with a full range of peripherals.

The 9830A is conservatively described as a desk-top calculator. Actually, it is a full-function (e.g., multi-level nesting, conditional transfers, etc.) BASIC-language computer, consisting of 16K bytes of ROM, up to 16K bytes of RAM, 32-character LED display, typewriter keyboard and 64K byte cassette drive. A 9830A with 16K bytes of user-available RAM is $10,560. Although priced higher than the 5100, the 9830A is considerably more versatile. Options include eleven plug-in ROM modules – including three for data communications – eight I/O peripherals, special interface cards for test instrument and control applications, and more than fifty software packages in eight application areas.

The Wang Laboratories 2200-S, also a full-range BASIC computer, was introduced at the end of 1974. It is a two-box system, consisting of a separately-packaged processor/memory unit and a console with 9", 1024-character CRT, cassette drive and keyboard. Total weight of the two cabinets is less than 90 lbs.

The 2200-S comes in at $5,400 with 24K bytes of ROM and 4K bytes of RAM, and tops out at $12,600 with 32K bytes of RAM. At the 16K bytes level, the 2200-S is *less* expensive than the 16K byte, BASIC-only model of the 5100: $8,600 vs. $8,975. Indeed, this $375 difference, according to Wang Labs' Edward Lesnick, is only the tip of the iceberg. The 2200-S is available in a 12K bytes configuration, of which only 700 bytes are reserved from the user, for $7,400. Lesnick maintains that 4,400 bytes of the 5100's RAM are always unavailable for user storage, thereby giving Wang a $1,575 price advantage. Lesnick also claims that the 5100 is slower and less efficient than the 2200-S in its use of memory. As for the top end of the 5100 line, Lesnick points to the WCS-20, an all-in-one-desk version of the 2200-S with 42K bytes of ROM, 8K bytes of RAM, 12" CRT, keyboard and 250K bytes of floppy disk for $11,000. Overlays called in from the floppy would do for "most" applications, says Lesnick, and for another $3,000, two additional floppies could be added.

Lesnick's argument's regarding 5100 competition at the 16K level are strong, as is Wang Labs' software and peripherals support for the 2200-S. But where the WCS-20 is indeed better suited to many applications than upper-level 5100's, it is precisely because these two systems are *not* comparable. RAM, and lots of it, is what the 5100 is all about. Overlays and auxiliary storage are not.

THREE FROM DEC

Consider, for example, Digital Equipment's "triple announcement" earlier this year: the commercial Datasystem 310; the CMS/1 interactive engineering system; and the "Classic," an interactive system for educational applications – all centered around PDP-8/A minis. Only one of these systems is likely to be affected by the 5100.

DEC's "Classic" gives the user access to 20K 12-bit words (of the 32K provided) of core RAM; a VT50, 12 x 80-character CRT with electrolytic copier; dual floppies; and BASIC. RAM is certainly adequate for everyday educational use, and the floppies provide a large measure of flexibility. The "Classic" sells for $7,900. A 16K BASIC 5100 with printer is $12,650.

The Datasystem 310 is a disk-based business system for under $15,000. If you need a disk-based business system, you should have a disk-based business system; not a 5100.

The CMS/1 offers a *nominal* 32K of RAM with a VT50 and a set of dual floppies for $12,000, and makes the electrolytic printer and a 30 cps DECwriter available as options. For software, Fortran IV is standard; BASIC and COGO, the civil engineering language, are options. This one could be affected.

ALL A MATTER OF MEMORY

In any case, like the Hewlett-Packard and Wang systems mentioned previously, the CMS/1 is not, nor was it designed, for programs that require upwards of 32K bytes of RAM. If you **need** that much memory in a small thinking machine, the 5100 is the only way to go. If you **don't** need that much, and peripheral flexibility is important, there are many ways to go. ■

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More flexibility for data banks

New 'relational' systems simplify storage, answer impromptu questions

"I'm ecstatic over it," exclaims John F. Bartol, a medical data analyst at Hoechst-Roussel Pharmaceuticals Inc. of Somerville, N. J., a subsidiary of American Hoechst Corp. Bartol is talking about a new computerized management information system called Nomad. He uses it to prepare reports on clinical drug tests required by the Food & Drug Administration. "Nomad enables us to respond almost immediately to impromptu questions," he explains. If so, says an outside software expert, "that would represent a tremendous breakthrough."

Nomad was announced late last month by National CSS, a Norwalk (Conn.) company that sells computer time-sharing services. At the time NCSS's product manager, James McGuire, boasted that it "will give us a competitive edge" over the other companies in the field. But the edge lasted about two weeks–until Tymshare Inc. in Cupertino, Calif., announced a similar system called Magnum. McGuire insists, however, that Nomad is easier to use because it responds to simpler English commands. Tymshare's product manager, Thomas Tranfaglia, takes issue with this claim, of course.

Both NCSS and Tymshare are relatively small companies in the $500 million a year time-sharing industry–with NCSS revenues running at $33 million annually and Tymshare's at $46 million. But the two publicly owned companies are also the largest independents among some 58 contenders that include General Electric Co.'s Information Systems Div. and Control Data Corp.'s Service Bureau Corp.

Time sharing permits many users to access a computer from different remote locations by means of a telephone and computer terminal. It was first commercialized as a calculating tool for scientists and engineers, but now management information, or data base, systems are the fastest growing part of the time-sharing business.

Nomad and Magnum are both aimed at the same kind of job–typically to convert voluminous raw data on sales, inventories, production scheduling, test information, and the like into summary reports. Other management information systems do that too, but the two new ones are the first to put into commercial use a more efficient "relational" technology for organizing the data.

Conventional data bases use a "hierarchical" structure that is limited to filing and retrieving all the data-base items through a link to one key reference. Relational systems, developed theoretically in the late 1960s, overcome this inflexibility by linking the data with cross references.

For example, in a hierarchical data base for a parts inventory system, the suppliers probably will be the key reference. Even if the user wants data such as part numbers, units on hand, or slipped deliveries, he must program his requests by means of the suppliers' identities. A relational system does not organize data in this rigid fashion, and field-test users report many benefits:

SIMPLER STORAGE: Ethyl Corp.'s engineering department in Baton Rouge, La., uses Tymshare's Magnum to keep track of the time that some 40 draftsmen spend on various projects. Under the former hierarchical system, explains design supervisor Samuel Brown, the data for separate reports, such as overtime and total hours worked on each project, had to be kept in separate computer files. "Otherwise, we could not break out the two sets of data independently," he says. "With Magnum, we now use only one data bank and can turn out any kind of report we want in one pass."

MORE FLEXIBLE FORMAT: Relational systems enable a user to select a printout with any arrangement of columns, headings, margins, totals, and so on. With hierarchical systems, the format is fixed. That is why NCSS's Nomad appeals to Richard J. Hannon, manager of marketing information services at U. S. Pharmaceutical Co., an E. R. Squibb & Sons subsidiary. Hannon keeps computerized sales records for 12 product managers on 1,750 items.

"A good-looking report is critical in marketing," he says, "and Nomad has eliminated about all the deficiencies in formating that I have ever seen in other data-base systems." For example, columns may be titled with words of a user's choice rather than with code letters, and there are both a zero symbol and a "not-available" abbreviation instead of the double-duty, ambiguous zero.

Donald E. Seese, controller at Wells Fargo Bank in San Francisco, concurs. He is converting the bank's profit planning and functional cost file to Magnum, partly because "we will be able to make formating changes that we couldn't do previously." Says NCSS's McGuire: "It is unique that a generalized program can do specialized formating."

VARIED OUTPUT: Relational systems can turn out responses to unforseen questions, unlike hierarchical systems where all reporting needs must be determined when they are set up. New England Merchants National Bank in Boston, for example, is putting "every bit of information" on its certificates of deposit into a Nomad data base, says a spokesman. "We don't even need to anticipate the usefulness of the data. If anything unforseen occurs, the machine has stored the information needed to prepare a report."

Users also point to big operational savings. Ethyl's Brown was spending $1,500 to $2,000 per month simply to store data in his old system. "Magnum should be able to cut that storage cost by 50%," he says. And he anticipates saving 15% to 20% more in processing time. Bartol of Hoechst-Roussel likewise claims big savings. "It costs 85¢ to develop and generate an output request with Nomad," he says. "Under our previous system, it cost $4.50."

Some users look more for added opportunities than for potential savings. Squibb's Hannon says he expects no reduction in his department's budget because, "I find that I am now able to use our Nomad data base in so many more ways than I would under our prior system." The higher unit prices that both companies are charging for their new systems may also limit savings.

Some industry people do not expect the new system to catch on widely because most big companies already have data bases in place. To convert them would take huge investments in money and retraining, and there would be chaos during the transition, they say. Even McGuire concedes that Nomad will be used primarily in setting up new data bases. But, he adds, this still provides a market that is growing at a rate of 25% a year. "For new data bases," he says, "relational technology is the way the industry will go." ■

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Time On Their Hands

Once there were 200 time-sharing companies. Now there are only 50. Soon there will be . . .?

GEORGE J. FEENEY runs General Electric's Information Services division. He is also the most eloquent prophet of computer time-sharing—the business where customers rent time on someone else's computers instead of tying up capital to buy their own.

"Computing will increasingly be purchased as a utility service much like electric power or water," Feeney has prophesied. "The major vendors will truly resemble utilities. They will provide computer power to virtually every community seven days a week, 24 hours a day, with services to match the needs of small businesses, research and development organizations and worldwide corporations."

If George Feeney is right GE, Control Data, Computer Sciences Corp. and several others currently building up huge international time-sharing networks will be in clover. For now, however, the time-sharing business is more like a nightmare. A red-hot concept just ten years ago, with revenues growing by 25% a year, time-sharing was attracting new entrants at the rate of nearly one a week in the late Sixties. At one point some 200 companies offered customers simultaneous access to master computers from terminals located in their own offices or plants. Today only 50 companies remain, and by the end of the Seventies, by wide agreement, the number may well be down to ten or fewer.

Present survivors, like Tymshare, National CSS and Automatic Data Processing (*see table*), have tried to improve their staying power by buying up the businesses of some of the stragglers. "Of the 50-odd companies still around," says President Robert J. O'Brien of Rapidata, "20% are losing money, 10% are barely breaking even and the rest are making anywhere from 5% to 20% on sales after taxes."

What happened to a business that looked so promising just a few years ago? Overcrowding is an obvious answer. But if the business had measured up to the glowing expectations, there would have been plenty of room for almost everyone. Predictions were that the business would be running $1.8 billion a year by 1975; actual revenues are estimated by a recent Quantum Science survey to be half that.

The Little Devils

The minicomputer revolution, which also got rolling in the late Sixties, caused the first nightmares for time-sharing boys. Back when it was simply a choice between renting time on someone else's equipment and investing in a large or even standard-sized computer of one's own, customers came a-running to the time-sharing outfits. But when it became cheaper for a small businessman or the research division of a large corporation to buy a mini rather than rent time, the squeeze was on in time-sharing. More recently, Sperry Rand, International Business Machines and other mainframe manufacturers have begun selling new lines of communications-linked computers that let customers set up their own networks. Another setback for time-sharing.

George Feeney's response is the idea of computer utilities with global, round-the-clock time-sharing networks. GE's Mark III network, in which it has invested some $200 million so far, stretches all the way from western Europe to the western Pacific. The others, for the most part, cover only sections of the U.S. and Europe. Tied in with these networks are data-storage banks and broadly designed software programs that are intended both to make the networks more useful to customers and to lock the customers more tightly into them.

Using a Computer Sciences setup, for example, all U.S. Army recruiters can instantly place a new recruit's special skills and preferences into a data bank, schedule him for basic training and enroll him in special schools. No one is sure what it would cost to duplicate such a system, but it would be extremely expensive; its monthly rental fee to CSC is $140,000.

Telephone companies are fairly big users of time-sharing for scheduling work forces, keeping track of repair records and designing entire telephone systems. They account for perhaps 10% of all revenues. The biggest customer by far, however, is the U.S. Government. This year Uncle Sam will spend about $240 million for various time-sharing services, twice last year's outlay.

Even if the overall growth proves a bit disappointing in time-sharing, there will be demand from big companies that need extra computer time during peak-load periods. The business is here to stay.

Under the circumstances, it is hard to see how General Electric can lose. It has the money and the reputation, and it got an early start. But the future for many of the smaller participants is dim: In a business like this, foresight isn't enough; you need staying power, too. ■

The Survivors / These ten companies, along with the captive operations of large companies like GE, Control Data and Boeing, are among the likely survivors in the time-sharing shakeout.

Company	Latest Annual Revenues (millions)	Change From Prior Year	Latest Annual Earnings Per Share	Change From Prior Year	Return On Capital	Stock Data: Recent Price	Stock Data: 1975 Price Range	Stock Data: P/E Ratio
Automatic Data Processing	$154P	26%	$1.98P	19%	18.3%	52	65 -27¼	29
Computer Network	3.8	–1	–0.46	P-D	def	2⅜	2⅜ - ½	—
Computer Sciences	177.4	21	0.26	116	7.8	4½	6⅜ - 1¾	19
Com-Share	12.3	29	0.55	–8	10.8	2⅞	4⅛ - 2⅝	4
Keydata Corp	11.7	23	–0.22	P-D	def	2⅝	3⅜ - 1¾	—
National CSS	32.3	37	1.67	16	19.9	10	14 - 5¾	6
On-Line Systems	11.4	15	1.50	–22	15.6	13⅞	17⅞ - 8	10
Rapidata	11.5	21	0.28	–30	11.3	3½	5¼ - 1½	8
Tymshare	46.5	32	0.85	55	19.0	17¾	20⅝ - 6¾	18
Wyly Corp	80.4	–3	–1.28	D-D	def	3	4⅝ - 1⅝	—

NA—Not Available. D-D—Deficit to Deficit. P-D—Profit to Deficit. P—Preliminary. def.—Deficit.

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